CONTAINS SENSITIVE COMPARTMENTED INFORMATION

Octroi 25X1
SC 2154
Reports
RAK

November 23, 1956

George: [redacted]

The following is a report on our activities at the Ranch during the week of November 12th with work on the Hand Control. We had three sets of tests planned for this period:

(a.) Ground tests with the bug of the reworked Hand Control with all backlash removed.

(b.) Flight tests of the same Hand Control to prove tracking accuracy.

(c.) Flight tests of a timing device to measure the transition time of a known, fixed angle. This device was a motor driven attachment, breadboard, to a Hand Control.

Despite the fact we had warned the Ranch through EFM and WAS via telephone that such tests were planned, there was some delay in initiating the tests. As you are aware, this is almost standard practice when initiating new tests. On Monday we found that the vehicle was not ready. Some work was still being done in tuning up the autopilot. The Hand Control was set up from the test standards and connected to a Drift Sight which had a new reticle in it (reticle with cross hairs). The system was run by checking it against a "bug" on the floor. A number of operators including [redacted] were trained on this setup. Despite the fact that only one speed is available from the bug the training session was quite satisfactory. On this same day a Drift Sight was removed from a vehicle and a special reticle installed. This reticle contained two parallel lines to indicate a known, fixed angle for use in test (c.). The Drift Sight was then reinstalled. 25X1

The entire Tuesday morning and Tuesday evening was spent completing the installation of the Drift Sight in the vehicle, continuing with the operator training on the bug. Wednesday was spent boresighting and in checking with the installation, having the Hand Control with the timing device attached. Interference problems were encountered with this breadboard timing device. The interference was primarily with the sextant averager and required the removal of a riveted bracket and sundry pieces and parts.

Thursday two missions were scheduled, one for the morning and one for the afternoon. Unfortunately the morning mission was aborted due to vehicle difficulties. The afternoon mission was accomplished. However, the Hand Control "froze" and could not be moved. Investigation immediately after availability of vehicle disclosed that the Hand Control proper was free but that the flexible cables were exceedingly stiff and difficult to turn. A more complete check that evening disclosed that the residual oil in the flexible cable strands themselves was responsible and caused the stiffness.

Friday, one mission was scheduled for a test with the timing device. As a check on its accuracy Tracking Camera pictures were taken. Analysis of the Tracking Camera pictures was made the following week (week of November 19th).

This fairly well covers the actual operations at the Ranch and averaged a 14 hour working day. As a result of the tests we have been able to draw and substantiate the following conclusions:

No oil at all is permissible in the flexible cables. We have been in touch with Kupfrian and S. S. White, manufacturers of flexible cables, and have found that we can secure oil-free moly-coated cables on special order. We have secured one such set of cables and will make another trip to the Ranch November 26th to install them and test. We have also investigated the need for considering an oil problem in the Drift Sight head (the area of the scanning mechanism). After making some sample tests during the week of November 19th at our plant we found that there was sufficient oil film on some bearings to warrant removal. These are some special bearings which could not be made of stainless steel and require oil for rust prevention. We had on hand a complete Drift Sight which had been returned for repairs. This unit, serial #109, has been completely repaired and is currently being de-oiled. This serial #109 will be hand carried by our people to the Ranch for their trip of November 26th.

The largest error runs on the Black Box (timing device), were on the order of " 1 " milliradians per second. This is not an absolute measurement since we were forced to use photographic results from the Tracking Camera which had its clock completely overexposed. The time base was therefore based upon the average known interval between frames.

A check of vehicles at the Ranch showed us that only three of the available vehicles had had the flexible cables rerouted. This was on vehicles #357, #359, and #360.

From all of the above I feel that we have put our finger on the difficulty and have a solution for it which will be tested the week of November 26th.

TWM

TWM:hm
cc: RH

SC-21

CONTAINS SENSITIVE COMPARTMENTED INFORMATION

[redacted]

December 7, 1956

George:

On November 26th two of our men went out to the ranch to continue and complete tests on the reworked Hand Control for the purpose of determining Hand Control tracking rate accuracy. They brought with them a set of de-greased flexible cables and a complete Drift Sight. The head of the Drift Sight, which contains the Scanning Mechanism, had all gears de-oiled and clearances provided to compensate for the coefficient of expansion of metal parts.

They arrived the 26th of November and were able to obtain access to article 360. They removed the Drift Sight currently in place and replaced it with the "de-oiled" Drift Sight they had brought with them. This took up most of the day. In addition, they trained an operator on the Drift Sight ground test setup.

On the 27th of November they got off a successful mission using article 360, which contained a 24" f/8 camera fixed in a vertical position. In addition, instructions and equipment were provided to measure the Hand Control potentiometer output for tracking rate. The Hand Control used was one which had been reworked to eliminate backlash, and had been set up on their previous trip.

On the 28th of November a second mission had been planned but aborted due to article difficulties. The rest of the day was spent in training operators on the ground test setup.

On the 29th of November mission 2 was successfully completed, furnishing actual data on tracking accuracy. Some of the data was collated that evening indicated tracking rate errors of .1 and 1.5 milliradians per second or less. This error is subject to revision since it also includes any errors due to pitch rates. Thus, actual tracking error of the Hand Control proper should be in this range. The 30th of November was lost since the shuttle left at 10 a.m.

The computation of information obtained in missions 1 and 2 is being compiled this week. It is a rather tedious operation and, unfortunately, requires 3 or 4 days of intensive work. The results of this computation should be available the week of December 10th.

As a matter of academic interest, it was discovered upon removal of the Drift Sight on the 26th of November, that the power changer was inoperative. (This Drift Sight was the one replaced by the "de-oiled" Drift Sight used in missions 1 and 2). Upon the disassembly of this Drift Sight, which was serial #121, a large amount of metal chips (not filings) were found inside the tube. In addition, a quantity of oil had somehow or other gotten on the

inside of the tube. The combination of chips and the oil, which had become quite gummy, prevented the power changer mechanism and lens cell from moving. There was no evidence of oil on the optical elements. Oil inside the tube would indicate that some attempt had been made to lubricate the power changer mechanism. When the Drift Sight leaves our plant no lubrication is used, it was designed to operate dry. This is all the detective work we were able to accomplish. It would seem that some unauthorized work was done on this particular Drift Sight. The time at which this may have been done could have been any time after its original shipment date which was in October of this year.

TWM
cc: RH
EFM

KAK

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File Ostrich
SC-21-54
Reports

December 10, 1956

George:

We have received from [redacted], Serial #100, (Lot I equipment, part number PE 152-0116). This is the original prototype Hand Control. It is over and above the quantity of 23 production Hand Controls furnished under our contract. As a prototype it does not represent a production unit. In addition, this particular prototype underwent considerable mechanical revision which resulted in the production design. Because of this we do not feel that the unit is repairable or salvageable. Our recommendation is to remove it from use in this system since it does not represent one of any quantity you planned to utilize. However, the unit is your property and, in a sense, marks a milestone in the history of this project. Will you please tell me what disposition you wish us to make of this unit. I shall hold it until I hear from you. 25X1

Tom

TWM:hm
cc: W. Denard

Welch

Unit now at Rand. Will wind up at [redacted] as surplus. 25X1

RCC
4 Apr 57

PCS/DCI
1956 DEC 21 PM 2:08

COPY 1 OF 2

December 12, 1956

George:

This is a summary of our conference of November 6th with Dick in Washington D. C.

The FOG group will remain at the Ranch until April 1, 1957 at least.

We have been requested to examine the possibility of providing rear scanning in the MK II Drift Sight and, if possible, in the MK I Drift Sight. As part of this examination we are instructing [redacted] to boresight one Drift Sight backwards. [redacted] will run necessary tests to determine the feasibility of such scanning. I passed instructions on to our man [redacted] at the Ranch, to boresight one Drift Sight backwards, and then to notify the Ranch Ops as soon as he accomplished the reversing. 25X1 25X1 25X1 25X1

We have also been requested to examine the possibility of a reworked MK I Drift Sight to accept the currently designed servo drive of MK II. Such retrofitting and reworking is to be done the same time as I receive MK I units for Baird modification, sharp prisms, new corner mirror, and new reticle. The purpose of such reworking would be to provide a means for backward scanning with an electric Hand Control if [redacted] tests are successful. 25X1

As part of this rear scanning we should also examine the need for additional Memory Units to be used by the FOG group for their "C" Configurations. The desired time schedule for such retrofitting of Hand Controls and Periscopes is March 1957 for four or five articles.

The above request requires careful consideration in order to arrive at an optimum combination of MK I and MK II equipment. I am planning to make a careful study of this with [redacted] around December 13. At the same time we will take into account Don's findings as the result of his last trip at the Ranch on tracking rate accuracy. There are a considerable number of parameters in arriving at a recommendation. 25X1

Some time ago I generated a proposal request for six Memory Units to be used by the FOG group with the MK II Hand Control. This proposal is still in preparation.

It looks quite possible that we will be receiving a request to manufacture three more sets of ALF glass for delivery starting August 1957. Such a request should be in to us some time between now and February 1.

On a new subject: I am requesting [redacted] to prepare a condensed statement of costs to date and estimated costs to complete (through the Engineering Department on costs to complete) on our Lot I contract. It is my intention to 25X1

furnish this information to you with a letter requesting that we postpone the 75% renegotiation until a more convenient time.

TWM:hm